

28 March 2011

From: Rex Buddenberg

Reference: DA 11-537

PUBLIC SAFETY AND HOMELAND SECURITY BUREAU SEEKS COMMENT ON  
PETITION FOR DECLARATORY RULING ASKING TO CLARIFY THE SCOPE OF  
SECTION 337 REGARDING USE BY STATE OR LOCAL GOVERNMENT ENTITIES OF  
THE 700 MHZ PUBLIC SAFETY BROADBAND SPECTRUM

PS Docket No. 06-229

The Public Safety and Homeland Security Bureau seeks comment on  
the Petition.

... discussions regarding permissible use of 700 MHz broadband  
spectrum ....

This is an important question to settle for

- operational requirements reasons,
- spectrum conservation reasons,
- and for economic reasons.

Requirement. EMS<sup>1</sup> unquestionably need 'assured access' through the communications system in order to do their jobs. In the past, this requirement has necessitated radio communications systems built to operate in spectrum especially set aside for that purpose. But the technology has changed and the underlying assumptions need to be reviewed.

We should immediately note that we have attempted to provide 'assured access' for the non-EMS citizenry over the telephone network for years for traffic like 911 calls<sup>2</sup>. The requirement is hardly exclusive to formal EMS.

Technology observations. The two broadband<sup>3</sup> radio technologies discussed for the 700MHz block of spectrum are IEEE 802.16 and TIA Long Term Evolution (LTE). There are two fundamental differences here from what has gone before:

- the first is that both standards represent routable networks – we're in a shared-use, packet-switched environment. This means that the infrastructure compliant with the standards can be used to extend the internet. Therefore the 'assured access' characteristics need to be end-to-end across an internetwork that has a radio-WAN segment in it ... along with one or more wired network segments. This end-to-end QoS problem is valid theoretically, but is not a practical difficulty since the terrestrial WAN and wired LANs are usually provisioned about four orders of magnitude more amply than the radio-WAN segment<sup>4</sup>.

---

1 Your inquiry seems to define 'EMS' a bit ambiguously. I am here using EMS in an open-ended definition, to include fire, police, ambulance ... and more. For instance snowplows.

2 See inside front cover of just about any paper telephone book. Especially if you can find one for areas with party line service.

3 The petitioner uses the phrase "...processing of 700 MHz narrowband applications indicate...". But your title and text specifically use the term 'broadband'. While the definition of broadband is vague, I'm assuming that it's certainly not narrowband. If this assumption is not true, then my technical reasonings fail. The essential characteristic of broadband is a base station and multiple subscriber stations with layer 2 connections in force simultaneously.

4 Once the radio-WAN becomes an interior network segment, instead of one at the fringe, this ceases to be a purely

- The second – immediately germane to this inquiry – is that both network segment standards have a contention-free media access controller (MAC). The important observation is that subscriber stations in one of these network segments indeed do have guaranteed access, and they do not need segregated spectrum to get it.<sup>5</sup>

Technology observation: spectrum segregation is no longer required to provide assured access.

Interoperability observation. If a segregated spectrum solution is required, then it offers nothing to a next generation 911 application because the general citizenry cannot use the segregated infrastructure.

Economic observation. Since communications reach to the citizenry is required (the National Broadband Plan and the Next Generation 911 NOI have both made this abundantly clear), segregated spectrum means that we must build (to high availability requirements) two infrastructures – one for exclusive EMS use and another for everyone else, especially including 911 callers. This is not spectrum-conservative – any 700MHz spectrum beyond that actually used by EMS would be unused, wasted. Further, the duplication of infrastructure is expensive and the replication adds nothing to the network robustness. Further, the 700MHz infrastructure would have to be funded wholly from the tax base since there's no commercial incentive for private industry. All of this runs counter to the public-private partnership desiderata in the National Broadband Plan.

Policy recommendation: permissible use of the 700MHz band should include any use, including even commercial sale of services. Providing that emergency services come first. The language should foster public-private partnerships and not require first responders to be the owner/operator of the infrastructure.

Thank you.

/s/ Rex Buddenberg

---

theoretical issue. But the issue cannot be remedied by segregated spectrum solutions so the discussion is outside scope of your inquiry.

5 The most important characteristic of contention-free MACs is that they are stable under overload (unlike, for example, IEEE 802.11 WiFi). Secondary characteristics include high bandwidth efficiency and the ability to control, neither of which are present in contention MACs. We should also note that the discipline has not changed, only the names and the level of automation have: contention-oriented MACs are what we used to call 'free nets' while contention-free MACs used to be called 'directed nets'.